

suture. Sculpture, evidently irregularly punctate, no signs of liræ.

S. hinkleyi Walker. Apical whorls more or less elevated, bluntly rounded. Apical whorl flatly rounded, not constricted by the suture, apex immersed. Sculpture, very finely and irregularly punctate above and more or less lirate below.

S. humerosus Walker. Apical whorl much elevated, everted, rounded and constricted by the suture. Sculpture, punctate above and lirate below.

S. integer Say. Apical whorl not everted, flatter than in *subglobosus*. Sculpture, scarcely more than wrinkled, no liræ.

S. mexicanus Pilsbry. Apical whorls elevated, rather pyramidal, more so than in any other species, closely coiled, rather acutely pointed. Apical whorl only slightly everted, not constricted by the suture. Sculpture, closely, finely and irregularly punctate, no liræ.

(To be continued.)

THE NEW MEXICAN EXPEDITION OF 1914—ASHMUNELLA.

BY H. A. PILSBRY AND JAS. H. FERRISS.

(Concluded from page 35).

ASHMUNELLA DANIELSI DISPAR n. subsp. Pl. 2, fig. 2.

Smaller than *A. danielsi*, composed of 5 whorls, and like that in having no trace of a parietal tooth. The long tooth in the outer lip is strongly developed. The two basal teeth are nearer together, and more or less completely united or sometimes fused into one. The umbilicus enlarges very little at the last whorl.

Height 5.8, diam. 11.2 mm.

Smallest adult, diam. 9.8, largest 11.25 mm.

Locality.—Station 55 (1914), Little Whitewater Canyon, Mogollon Mountains.

One of the smallest *Ashmunellas*. It runs parallel to *A. duplicidens* of the Chiricahua range in structure of the basal teeth.

One hundred examples were collected. No other shells were found at this station except a few of the smaller families.

The locality is at an elevation of about 7,500 feet, six miles east of Glenwood, Socorro Co., N. M. The canyon was explored only to Kitt's mining cabin.

ASHMUNELLA PILSBRYANA Ferriss. Pl. 2, figs. 3.

Ashmunella pilsbryana Ferriss, Nautilus Vol. 27, p. 109 (1914).

Distinguished from other species of this region by its acutely angular periphery and granulose surface.

Ashmunella pilsbryana has not been taken in the Mogollon range, but in the region westward. It has been found only in a small territory along the San Francisco river, and in company with no other large shell except *Sonorella*. A mile or so back in the hills from the Harper ranch, and four miles above Clifton, Arizona, a few dead shells were found in the rock slides. The removal of timber had apparently killed the snails. Only a couple of living *Sonorellas* were found here in half a day, but no living *Ashmunellas*.

Two miles above the mouth of the Blue river colonies of *A. pilsbryana* and a small *Sonorella* were found in a thrifty condition, and a couple of smaller colonies were located in between this station and the Harper ranch. All of these are within some twenty miles of river front. These colonies were in shaded talus that ran down to the flood plain. *A. pilsbryana* will probably be found farther up the San Francisco river, but none were found in the vicinity of Alma, New Mexico. The rock in that stretch of river may have held mineral qualities distasteful to all snails.

ASHMUNELLA MOGOLLONENSIS Pils.

This fine species is rather widely spread in the Mogollons. It was found in 24 colonies in Silver Creek canyon, in the village along the Bursam road (a trail running east from Mogollon across the crest of the range) to Willow Creek, and again in Big Dry Creek Canyon. The latter were large and bright-colored, distinctly striated with incised spiral lines on all but the embryonic whorls. One measures 10.8 mm. alt. by 22 mm. diameter.

Shells from the colonies upon Silver and Willow Creeks varied much in size, though some colonies had large and small. The

smallest on these streams was 7.6 mm. alt. by 15 diameter; the largest was 20 mm. in diameter. One colony had fine albinos.

MIGRATION OF ILYANASSA OBSOLETA, LITORINA LITOREA
AND LITORINA RUDIS.

BY C. H. BATCHELDER.

The migration of a species is an important event in the history of a brackish water stream. It marks at once, the departure of somebody's food and the passing of *somebody else's* enemy; it means that the biological relations of the remaining species will be upset and that readjustment must take place. With the passing of an enemy, a species that has lived in seclusion prospers, multiplies and assumes other abodes previously inaccessible. In new situations new foods become available,—and so things change. The snails of a brackish-water stream are as subject to annual migrations as the other inhabitants and some of them are extremely interesting to observe. Migrations of *Nassa obsoleta*, *L. litorea* and *L. rudis* were observed on Oyster river, Durham, N. H. in 1914–15 and the following is an account of the movements.

The most notable molluscan migrations that I have observed are the annual movements of *Ilyanassa obsoleta*. During late spring, summer and early fall it inhabits the mud flats exposed at low-tide. This environment becomes impossible, however, during the colder months when ground-ice may form and this forces the snail to migrate to the deeper waters for the winter.

Migration of *Ilyanassa* downstream was first observed on the 18th of October in 1914 and it had probably proceeded then during five or six days. Migration continued during the next two weeks but the greater number of healthier individuals moved down-stream in the week ending October 25. The rate of their movement appeared to depend somewhat on the temperature but no measurements were taken in support of this. The healthy individuals moved out into the deep water of the channel to depths varying from ten to fifteen feet at low tide.